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JUL 30 1991

Before The
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

In the Matter of)

ECHO GROUP L.P.)

Petition for Rulemaking to Amend)
Section 2.106 of the Commission's)
Rules to Create a New Mobile Data)
Radio Service ("MDRS") in the)
930-931 MHz Band)

ET 92-100

RM - RM-7782

ECHO GROUP L.P.
PETITION FOR RULEMAKING

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SUMMARY

Echo Group L.P. ("Echo") urges the Commission to initiate a rulemaking to establish a new two-way, terrestrial mobile data radio service ("MDRS") and to promulgate rules for the awarding of three local and three nationwide commercial MDRS licenses using 300 KHz of spectrum -- 50 KHz per licensee - within the 930-931 MHz band. Echo's proposed system is based on a new, inexpensive digital compact mobile data radio that has already been tested and that represents a major cost breakthrough that will enable licensees to offer sophisticated two-way mobile data services in real time sequences.

The system will employ frequency division, Time Division Multiple Access ("TDMA") techniques that use a much greater percentage of the available spectrum within each channel to transmit information than do most other transmission techniques, thereby greatly increasing spectrum efficiency. Data will be transmitted through packet transmissions and the systems will employ frequency reuse and hand-off capabilities. This MDRS narrowband technology will provide new or improved emergency radio location and tracking services, medical and environmental emergency services, services for the handicapped -- particularly

the hearing- and speech-impaired -- as well as other commercial, personal, and emergency services. The proposed 930-931 MHz range will provide the necessary in-building penetration crucial to these types of MDRS applications, yet Echo's proposed limited allocation of only 300 KHz will leave still a significant amount of spectrum remaining for other services proposed in this frequency band.

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ET 97-100
RM - 7782

ECHO GROUP L.P.
PETITION FOR RULEMAKING

Echo Group L.P. ("Echo"), by its attorneys, hereby petitions the Commission, pursuant to Section 1.401 of the Commission's rules, 47 C.F.R. § 1.401, to initiate a rulemaking to establish a new two-way, terrestrial mobile data radio service ("MDRS"). Echo proposes that the Commission promulgate rules for the awarding of three local and three nationwide commercial MDRS licenses. Echo's proposed MDRS would permit the introduction of inexpensive but highly advanced, spectrum efficient technologies to meet the exploding demand for transmission of data by mobile users. Alternatively, Echo requests that the Commission incorporate its propos-

als into other rulemaking proceedings that it plans to initiate for allocation of the frequencies proposed herein or for any other rulemaking proceeding relating to mobile data services.

I. Introduction

In the last two decades, mobile radio services have increasingly grown in importance and use throughout the United States. The demand for services including cellular, paging, specialized mobile radio ("SMR"), and other private and common carrier services has risen beyond even the Commission's expectations. Yet, with the exception of paging -- which can transmit relatively short one-way messages -- existing mobile services are designed primarily (if not entirely) for voice communications. As a result, the need for two-way mobile data services has been largely unmet.

The Commission recently recognized the public interest in developing technically efficient mobile services -- including mobile data services -- in its Report and Order allocating frequencies in the 220-222 MHz band.* In that proceeding, the Commission allocated 10

* See Amendment of Part 90 of the Commission's Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Services, 6 F.C.C. Rcd. 2356 (1991).

individual channels specifically for narrowband, spectrum efficient mobile data radio services.* Although this allocation specified no set-aside for nationwide data-only licenses, the Commission emphasized the urgency in promoting the nationwide availability of spectrum efficient mobile radio technologies, both voice and data:

We agree . . . that nationwide assignments are a critical means of achieving the greater spectrum efficiency we expect from narrowband technology research and development. . . . Developments in recent years demonstrate a growing demand for nationwide land mobile services. Without a specific nationwide set-aside, however, establishment of nationwide systems . . . would be impractical or impossible. . . . Development of these technologies as they are applied to nationwide systems will ultimately provide a broader base of radio technology support for the marketplace.**

For these reasons, and for the reasons set forth below, Echo urges the Commission to propose rules for the exclusive licensing of a local and nationwide terrestrial mobile data radio service utilizing an advanced, narrow-

* Id. at 2362. The Commission reserved 10 additional data-only channels, but these will not be available until the Commission determines whether to allocate them for safety purposes in another proceeding. Id.

** Id. at 2361.

band technology in the currently reserved 930-931 MHz band.*

II. The Proposed Mobile Data Radio System

Echo proposes to construct and operate a low-cost nationwide mobile data radio system using ten 5 KHz channels within the 930-931 MHz band. Echo proposes that the Commission license six MDRS licensees, each receiving 50 KHz of spectrum as detailed below.

Echo's proposal is based on a new inexpensive Frequency Division, Time Division Multiple Access ("TDMA") compact mobile data radio, which has already been tested. Additional testing is ongoing.** The system utilizes a much greater percentage of the allotted spectrum within each channel to transmit information (rather than to maintain the information) than most other transmission techniques, which results in an increase in

* The Commission has reserved frequencies for nationwide applicants in other predominately local services, such as 900 MHz paging. See, e.g., 47 C.F.R. § 22.501(p)(1).

** Echo's MDRS is in the process of continued development and testing pursuant to an experimental license dating back to 1988. Echo will submit these test results to the Commission upon completion of the tests. See Echo Group L.P., Request for Pioneer's Preference, filed July 30, 1991, at 6.

spectrum efficiency. The paperback book-sized radio has a manufactured cost of approximately \$100 per radio and will be frequency agile -- able to seek out operational data channels and "log on" -- as with existing cellular or SMR systems. Echo's proposed base stations will cost less than \$10,000 each installed, including critically redundant components.* The proposed radio system employs packet transmission and is built upon a patent and proprietary techniques that will enable licensees to offer sophisticated two-way mobile data services in real time sequences using limited spectrum.

Each base station will consist of a pole antenna (6' to 12' high), a data radio and a standard personal computer connected to a packet switched network. The base station, which can be housed in an outdoor container, measures 2'6" x 2'6" x 9". The container can be mounted on an outdoor tower or building and connected by cable to the pole antenna. It plugs into normal AC current and can operate off an indoor battery back-up if needed.

* The radio design represents a major cost breakthrough. Other comparable systems sell for approximately \$1,500 or more for mobile units and as much as \$250,000 for base stations. This high capital cost serves as a barrier to mobile data use by individual users as well as to networking among multiple users.

Each mobile data radio measures $6\frac{1}{4}$ x $4\frac{1}{4}$ x $1\frac{1}{4}$. Each radio will directly communicate with the user through a keypad and display or interface directly with a range of user equipment. The data flow will be controlled by the base station using patented techniques to handle "bursty" packet data messages. Multiple channels at a base station will be treated as a trunk group, with user messages handled to even loads on channels to achieve the highest spectral efficiency.

For base station-to-mobile unit communications, there will be one TDM packet radio at each base station operating on each 5 KHz channel. For mobile unit-to-base station communications, the system will employ Frequency Division TDMA techniques. Further, mobile units will automatically adjust their output power to the lowest levels at which the base station can receive signals, thereby reducing interference and increasing efficiency. Mobile units will also be able to measure signals from several base stations and report these signal strengths to their home base stations. Base stations will then communicate with one another to effectuate necessary "hand-offs" of mobile units. While hand-offs occur, in-progress transmission of unsent packets will be delayed until the best connection of the mobile unit and a base

station is established. The mobile unit's and base stations' memory capabilities will enable the system to achieve a low error rate even during hand-offs. With error checking and repeat transmissions, the error rate is less than one bit in 10 million.

The system would include multiple base stations in a given market area, the number of which would vary depending upon the scope of the geographical area and customer demand. Echo expects that the typical urban area would include 15 to 20 base stations. The frequency allocation strategy will permit reuse of channels within markets. Adjacent channels will have at least one coverage area between them to prevent interference. Base stations will normally be within line of sight of each other. Each base station will be connected to each other through a packet switched network. Data received at one base station can be relayed to the next base station or transferred to the packet switched network. Each base station thus may be a terminating point in the system or merely a relay point. Service will be dynamically allocated to users by system software.

III. The Services To Be Provided Through MDRS

Echo's proposed technology can provide numerous new or improved services. Rather than simply carrying voice, paging, and facsimile transmissions, MDRS will provide an optimal means to enable small, mobile computers to communicate with larger home/business computers through base stations that can be connected to the public switched telephone network ("PSTN") and/or to commercial packet switched networks.

For instance, two-way portable data radios can enable sales or service representatives to verify inventories or effect repairs, thereby providing in-the-field services currently available only at dedicated service centers. Additionally, Echo's narrowband technology could provide or significantly enhance emergency radio location or tracking services such as search and rescue services and medical or environmental emergency services. For example, ambulances or other rescue service vehicles equipped with data radios could process critical information en route to and from emergencies by transmitting actual data from equipment being used in the vehicle in real time to hospitals or police and fire stations (and receiving immediate responses), thereby affording greater protection to life and property. The handicapped, par-

ticularly hearing- or speech-impaired, could participate in social or professional mobile communications currently not available to them.

The proposed MDRS will also include services such as burglar alarm monitoring, personal computer data transmission, credit card verification, point-of-sale information monitoring, delivery service monitoring, and facility monitoring (e.g., electrical, heating, or air conditioning systems in high rise buildings). Due to these proposed radios and system design, Echo and other operators utilizing its spectrum efficient technology can offer these services at prices significantly lower than that which current technologies would offer.*

IV. 930-931 MHz Is Best-Suited For The Proposed MDRS

Echo has identified three frequency bands -- 901-902 MHz, 930-931 MHz, and 940-941 MHz -- with sufficient spectrum for allocation to MDRS, and it requests that the Commission allocate 300 KHz within the 930-931

* This two-way technology can also be used to enhance existing mobile data services in the private and common carrier services, including paging and those services offered under Part 90, Subpart J of the Commission's rules. Although Echo holds rights to use the MDRS technology, it proposes to license others to use the patented techniques.

MHz band for MDRS since this band was previously reserved for advanced mobile data messaging services.*

Unlike the 220-222 MHz frequencies subject of the Commission's PR Docket 89-552 proceeding, the 930-931 MHz frequencies will afford greater in-building penetration crucial to the types of MDRS applications described above. Further, were the Commission to assign 10 channels of 5 KHz each to each MDRS licensee, Echo could operate TDMA channels at bit rates of 2,400 (nine channels), 4,800 (five channels) or 9,600 (three channels) per second and transmit power levels of 20, 23, or 26 dBm, respectively.**

* Nevertheless, Echo's proposed technology can operate equally in all three of these frequency bands and Echo is willing to construct and operate a MDRS system as licensed by the Commission in any of the bands.

** Echo has also filed for commercial and non-commercial licenses in the Commission's recent allocation of the 220-222 MHz band. See supra pp. 2-3. Echo is filing this petition for rulemaking, however, because it believes that the 900 MHz frequencies requested herein will permit different applications than will be available at 220-222 MHz. Further, Echo proposes that the need for nationwide data delivery radio systems can be met only through the allocation and licensing of data-only systems to complement local systems.

V. The Proposed Allocation
Would Serve The Public Interest

The Commission initially reserved 930-931 MHz in its First Report and Order in General Docket 80-183.* Although the 930-931 MHz band is the subject of two ongoing proceedings and another petition for rulemaking, Echo submits that those proposed applications would not be as efficient as MDRS.

A. There is an Immediate Need for a Two-Way Mobile Data Frequency Allocation

Two-way mobile data service is one of the next telecommunications breakthroughs. The progression of computers from CPUs to PCs to laptop to notebook is creating an enormous demand for mobile data transmission capacity. The growth of laptop (and smaller) computers is predicted to provide the dominant share of growth in that industry for the next five years.** Remote monitoring, banking and sales transactions add to the demand for such services.

* Amendment of Parts 2 and 22 of the Commission's Rules to Allocate Spectrum in the 928-941 MHz Band and to Establish Other Rules, Policies, and Procedures for One-Way Paging Stations in the Domestic Public Land Mobile Radio Service, 89 F.C.C.2d 1337 (1982).

** See "Laptops Take Off," Business Week, March 18, 1991, p. 118.

Existing allocations have generally been designed for other applications and therefore do not permit manufacturers or users to realize fully the dramatic efficiency gains that are now available in the field of mobile data communications. The breakneck speed -- and substantial investments -- of progress in the mobile unit makes it imperative that the Commission respond quickly with a frequency allocation tailored precisely for the needs of this burgeoning industry.

Echo has proposed a relatively modest initial allocation (300 KHz with the remaining 700 KHz kept in reserve) so that the service can be established with minimal risk and, therefore, with minimal delay. Competing requests for the frequency do not warrant postponement of Echo's proposed allocation.

B. Allocation of Frequency to Echo's Proposed MDRS Will Better Serve The Public Interest Than Other Proposed Uses for the 930-931 MHz Band or Other Proposed Mobile Data Services

Other proposals for 930-931 MHz fall short of Echo's MDRS. First, the Commission is considering the 930-931 MHz band for allocation to the second generation cordless telephone ("CT-2") service.* This application,

* Amendment of the Commission's Rules to Establish New Personal Communications Services, 5 F.C.C. Rcd. 3995 (1990).

however, would spread CT-2 over three to four non-contiguous, one megahertz bands, a concept whose efficacy was seriously discredited by commenters in that proceeding. In fact, one of the central proponents of CT-2 and a holder of one of the earliest CT-2 experimental licenses has cancelled its support for use of 930-931 MHz for CT-2, and instead has opted for another contiguous block of four megahertz of spectrum.*

Second, the Commission is apparently considering 930-931 MHz for a low earth orbit satellite application proposed by Motorola, Inc.** Such an allocation, however, is arguably even more questionable than a CT-2 allocation. It is not clear that applicants for low earth orbit satellite service continue to prefer the 900 MHz band. Potential applicants have expressed preferences for lower, VHF frequencies because of greater power required at higher frequencies that would result in greater size and cost implications for subscriber hand-

* See Reply Comments of Advanced Cordless Technologies in General Docket 90-314, at 3, filed January 15, 1991.

** An Inquiry Relating to Preparation for the International Telecommunication Union World Administrative Radio Conference for Dealing With Frequency Allocations in Certain Parts of the Spectrum, Second Notice of Inquiry, FCC 90-316 (October 2, 1990).

sets. Additionally, the burdensome and lengthy coordination procedures under Article 14 of the Radio Regulations (WARC) almost dictate that any such satellite services should be offered in frequency bands already allocated for satellite use.

Further, other proposals for "mobile data" services fail to afford the flexibility and spectrum efficiency inherent in Echo's MDRS proposal or contain restrictions that will impede the utility of an MDRS. For instance, Apple Computer, Inc. ("Apple") has proposed that the Commission allocate the enormous sum of 40 MHz of spectrum for a local area "Data-PCS" service.* Apple's proposal would limit mobile data to areas within approximately 50 meters of a base station -- primarily on a single floor within a single building.** Accordingly, its proposal demands far more spectrum to provide less service than MDRS would offer. Additionally, Apple's proposal does not address the need for mobile data services on a community-wide or nationwide basis. Instead, Apple's focus is on a wireless computer interconnection

* Apple Computer, Inc. Petition for Rulemaking, "Data-PCS", filed January 28, 1991.

** Id. at 18.

service, which fails adequately to address the growing need for significant mobile data communications applications.

In fact, Apple states that cellular, SMR and other existing mobile services do not afford the high-quality and spectrum efficient properties inherent in its Data-PCS proposal.* Echo's proposed MDRS, however, would incorporate these properties in a state-of-the-art, low cost, wider-area service suitable for the casual as well as the sophisticated user. Further, Echo's proposed MDRS would also offer in-building capabilities -- with frequency reuse in nearby buildings -- making for a more efficient use and wider applicability of the available spectrum. In short, while there may be a legitimate use for Apple's proposed in-building Data-PCS, it is no substitute for a more comprehensive wide-area or national MDRS service.

Similarly, Orbital Communications Corporation's ("ORBCOMM") petition for rulemaking urges the adoption of a satellite-based mobile data service.** ORBCOMM's pro-

* Id. at 11-13.

** Petition of Orbital Communications Corporation for Amendment of Section 2.106 of the Commission's Rules to Establish a Mobile Data Service Using Low-Earth Orbit Satellites, RM 7334, filed February 28, 1990.

posed service, however, would be significantly more expensive to provide than a terrestrial-based service, particularly the low cost system Echo proposes. This would serve to bar entry of many would-be service providers that lack the financial ability or technical experience to launch a satellite system. ORBCOMM also proposes to use spectrum currently allocated in some areas, which would create the potential for interference between services and a lack of uniform frequency availability in all markets.* In fact, ORBCOMM's proposal does not propose to allocate spectrum to other service providers, but rather seeks authority simply to deploy its own system.**

Finally, Telocator has petitioned the Commission to allocate the 930-931 MHz band for "advanced messaging services." These services would include electronic mail, voice mail, facsimile and other graphic services. These one-way services, however, currently are available largely through existing technologies. Fur-

* This could impede development of regional or nationwide networking.

** Further, the technical feasibility of ORBCOMM's proposed system has yet to be demonstrated. See "Orbital Sciences's ORBCOMM-X LEO Satellite Unresponsive to Ground Commands," Communications Daily, July 29, 1991, at 8.

ther, although Telocator refers to the frequency congestion plaguing paging services in urban markets, it does not propose a frequency allocation reserved for service providers utilizing narrowband or other efficient, spectrum-saving modulation techniques. In contrast, Echo's proposed MDRS technology could offer the services suggested by Telocator as well as more sophisticated, two-way data processing and communications services using specific and proven techniques. Echo agrees with Telocator that new frequencies are needed to permit further development of mobile messaging services. Echo believes, however, that the public interest would be better served were the Commission to allocate part of the available spectrum to a more advanced mobile data service.*

No other proposal before the Commission proposes the dramatic cost-breakthroughs achieved by Echo's proposed network. Echo's mobile unit is expected to cost no more than \$100 per unit to produce. Base stations are similarly low priced at less than \$10,000 each installed. These costs will permit wide-spread use of mobile trans-

* Further, since Echo's proposed MDRS would occupy only 300 KHz of the spectrum between 930 MHz and 931 MHz, additional frequencies could be allocated to other services without interfering with MDRS.

mitter/receivers in consumer-priced products. The benefits to the public of more efficient services, such as information exchange, safety and utility monitoring and mobile telecommunications cannot be overstated. Echo requests that the Commission now take the first step by allocating the initial spectrum necessary to commence the service as soon as possible.

VI. Proposed Regulatory Treatment

Echo recognizes that the Commission can regulate MDRS as either a common carrier or private carrier service, and suggests that the Commission seek public comment on this issue. In any event, however, Echo proposes that, to the extent MDRS is classified as a common carrier service, MDRS providers should be classified from the outset as non-dominant and freed from regulation of rates and conditions of service, as well as licensee entry requirements. This would afford MDRS providers the necessary flexibility in promoting their new services as well as in competing with an already crowded mobile service marketplace.*

* Indeed, by the time the Commission can propose and adopt rules for MDRS, it is likely that, in addition to existing mobile services available under Parts 22 and 90 of the Commission's rules, the Commission will have allocated spectrum and commenced the li-
(Footnote continued)

Echo also proposes a pre-designated market licensing scheme as well as a blanket construction authorization approach within each carrier's market and for nationwide licenses. In this way, licensing and construction will be expedited and service to the public can commence more rapidly.*

Each MDRS licensee would need only 50 KHz of spectrum -- 10 channels of 5 KHz each -- to operate a system. Echo proposes that the Commission issue licenses to three nationwide applicants (as it did for nationwide paging) and three licensees in each Metropolitan Statistical Area ("MSA") and Rural Service Area ("RSA"). Each licensee should be licensed two non-contiguous 25 KHz frequency blocks to afford full duplex operation.

(Footnote * continued from previous page)
censing process for some form of personal communications services ("PCS").

- * Therefore, once a construction permit is issued, an MDRS licensee could construct its base stations and simply notify the Commission upon completion of construction and commencement of operations as for cellular, DEMS, and nationwide paging licensees. See, e.g., Revision and Update of Part 22 of the Public Mobile Radio Service Rules, 101 F.C.C.2d 799, 800 (1985); Public Information Collection Requirement Submitted to Office of Management and Budget for Review, 1991 FCC Lexis 1003, February 26, 1991 (Public Notice 11944).

In order to achieve the most efficient use of the limited spectrum available, MDRS should be limited to digital transmission techniques or other comparable spectrum efficient technologies. Further, just as the Commission has relaxed the height and power limitations for cellular and paging service providers, Echo proposes that antenna height and power restrictions be limited, particularly for nationwide MDRS licensees that, like nationwide paging licensees, will have to cover large geographic areas with each base station.* Additionally, the Commission should require each MDRS applicant to submit a demonstration of financial qualifications to construct and operate its proposed system for one year,** a demonstration (or certification) of reasonable assurance of site availability*** and a description of how the applicant proposes to implement digital, narrowband or other

* See, e.g., Height and Power Increases in the Public Mobile Service, 5 F.C.C. Rcd. 4604 (1990); Amendment of Parts 2 and 22 of the Commission's Rules to Permit Liberalization of Technology and Auxiliary Service Offerings in the Domestic Public Cellular Radio Telecommunications Service, 3 F.C.C. Rcd. 7033, 7036 (1988), recon., 5 F.C.C. Rcd. 1138 (1990).

** For nationwide systems, a longer operations period (e.g., three years) could be required.

*** For nationwide systems, site availability requirements should not apply, but applicants should be required to construct a specified minimum of base stations in different markets in the first years of operation, as the Commission required of nationwide 220-222 MHz applicants. See Amendment of Part 90 of the Commission's Rules to Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Services, 6 F.C.C. Rcd. 2356, 2365-67 (1991).

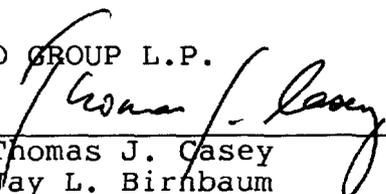
comparable technologies. Finally, MDRS users should not be individually licensed, but (like cellular subscribers) should be licensed under their service provider's authorization.

VII. Conclusion

In sum, Echo requests that the Commission initiate a rulemaking proceeding to authorize a new two-way, terrestrial mobile data radio service for commercial use in the 930-931 MHz band. Echo's proposed MDRS would introduce innovative services currently unavailable or underutilized at cost-effective prices and with spectrum efficient technologies.

Respectfully submitted,

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